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Supporting Information**Sijbren Otto, Jan B.F.N. Engberts* and Jan C.T. Kwak****Million-Fold Acceleration of a Diels-Alder Reaction due to Combined Lewis-Acid and
Micellar Catalysis in Water****Derivation of equation (1)**

Assuming complete binding of the dienophile to the micelle and making use of the pseudophase model, one can derive an expression relating the observed pseudo-first-order rate constant k_{obs} to the concentration of surfactant, $[S]$. Assuming a negligible contribution of the reaction in the aqueous phase to the overall rate, the second-order rate constant in the micellar pseudophase k_m is now given by the following equation:

$$k_m = \frac{k_{obs}}{[2]_m} \quad A1$$

Next we express $[2]_m$ as a function of the partition coefficient P_2 and the concentration of surfactant in the equation:

$$P_2 = \frac{[2]_m}{[2]_w} \quad A2$$

$$[2]_w = \frac{n_{2,w}}{V_w} = \frac{n_{2,t} - n_{2,m}}{V_w} = \frac{n_{2,t} - [2]_m \cdot V_m}{V_w} \quad A3$$

Where $n_{2,w}$, $n_{2,m}$ and $n_{2,t}$ are, respectively, the number of moles of **2** in the aqueous phase, the micellar phase and the total of the two. V_w and V_m are the volumes of the aqueous phase and the micellar pseudophase¹.

Substitution of A2 in A3 and solving for $[2]_m$ gives:

$$\frac{1}{[2]_m} = \frac{V_w}{P_2 \cdot n_{2,t}} + \frac{V_m}{n_{2,t}} \quad A4$$

The volume of the micellar pseudophase can be estimated from the molar volume of the micellized surfactant $V_{mol,S}$:

$$V_m = ([S] - cmc) \cdot V_t \cdot V_{mol,S} \quad A5$$

Substituting A5 in A4 and substituting $n_{2,t}$ with $[2]_t \cdot V_t$ yields:

$$\frac{1}{[2]_m} = \frac{V_w}{P_2 \cdot [2]_t \cdot V_t} + \frac{([S] - cmc) \cdot V_{mol,S}}{[2]_t} \quad A6$$

Combining A6 and A1 gives the final equation with which k_m and P_2 can be obtained by plotting $[2]_t/k_{obs}$ versus $[S]$.

$$\frac{[2]_t}{k_{obs}} = \frac{V_{mol,S}}{k_m} \cdot [S] + \frac{V_w}{P_2 \cdot V_t \cdot k_m} + \frac{cmc \cdot V_{mol,S}}{k_m} \quad A7$$

Note

- 1) Inevitably, the estimate of a molar volume of the micellized surfactant that is available for solubilization is somewhat arbitrary.